NATURAL RESOURCES CONSERVATION SERVICE

VIRGINIA CONSERVATION PRACTICE STANDARD

IRRIGATION STORAGE RESERVOIR

(No. and Ac-Ft)

CODE 436

DEFINITION

An irrigation water storage structure made by constructing a dam, embankment, or pit.

PURPOSE

Conserve water by holding it in storage until it is used to meet crop irrigation requirements.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to irrigation water storage structures that meet all the following criteria:

1. The water supply available to the irrigated area is insufficient to meet conservation irrigation requirements during part or all of the irrigation season.

2. Water is available for storage from surface runoff, streamflow, or a subsurface source.

3. A suitable site is available for the construction of a storage reservoir.

This standard pertains to the planning and functional design of irrigation storage reservoirs. Storage reservoirs shall be planned and located to serve as an integral part of an irrigation system.

This standard does not apply to Virginia Conservation Practice Standard *Irrigation Regulating Reservoir (Code 552)* designed primarily for flow control or to store water for a few hours or days. It does not include detailed design criteria or construction specifications for individual structures or components of the storage facility.

CRITERIA

The installation and operation of an Irrigation Storage Reservoir shall comply with all federal, state and local laws, rules and regulations.

The criteria for the design of components not addressed in NRCS conservation practice standards shall be consistent with sound engineering principles.

IRRIGATION DEMAND

The amount of water required to meet variations in water demand within the growing season must be determined to calculate storage requirements. All demand hydrographs shall be computed from the consumptive use-time relationship. Demand hydrographs shall be adjusted to reflect anticipated irrigation efficiency, conveyance losses, and any other consumptive uses, such as leaching or frost control.

STORAGE

Irrigation storage reservoirs shall be designed to satisfy irrigation requirements in the design area, unless limited by reservoir site characteristics, available watershed yield, or limitations imposed by water rights. Additional capacity shall be provided as needed for sediment storage.

Water releases shall be those increments of the water demand hydrograph that exceed the available direct flows from other sources.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

CAPACITY

Reservoir capacity required to satisfy irrigation demands shall be computed according to the length of the storage period, the anticipated inflow and outflow during this period, and the expected seepage and evaporation losses.

If storage capacity is limited, benefits may be evaluated on the basis of the more frequent availability of water to satisfy irrigation demands for the design area.

TYPE OF STRUCTURES

The type of dam, embankment, or pit and appurtenant structures shall be based on site-specific hydrologic studies, engineering, geologic investigations, and construction materials.

FOUNDATION, EMBANKMENT, AND SPILLWAY

Earthen dams, embankments, pits and appurtenant structures shall be designed to meet the criteria in the Virginia Conservation Practice Standard *Pond (Code 378)* or in TR-60, Earth Dams and Reservoirs, as appropriate.

Drop spillways, chute spillways, and box spillways shall be designed according to the principles of the National Engineering Handbook, Part 650, Engineering Field Handbook and the National Engineering Handbook, Part 634, Hydraulics; Section 11-Drop Spillways; or Section 14-Chute Spillways, as appropriate.

OVERFLOW PROTECTION

Overflow protection shall be provided for enclosed embankments.

OUTLET WORKS

Outlet works shall be provided for the controlled withdrawal or release of irrigation water. Outlet works may consist of a direct pumping system, or a gated conduit through or over the dam for gravitational flow to the irrigated area, to a pumping plant or another storage facility.

The capacity of the outlet works shall be sufficient to meet peak period irrigation system demands.

CONSIDERATIONS

When planning this practice, the following items should be considered, as applicable:

- Short-term and construction-related effects on the quality of downstream water courses.
- Potential for earth moving during construction to uncover or redistribute toxic materials.

Consider the effects on:

- The water budget, especially on evaporation, transpiration rates of runoff, infiltration, percolation, and ground water recharge.
- Downstream flows or aquifers that would affect other water uses or users.
- The volume of downstream flow that could have undesirable environmental, social, or economic effects.
- Erosion, sediment, soluble contaminants, and contaminants attached to sediment in runoff.
- The movement of dissolved substances to ground water.
- Downstream waters such as water temperature changes that could cause undesirable effects on aquatic and wildlife communities.
- Wetlands or water-related wildlife habitats.
- The visual quality of water resources.
- Cultural resources.

PLANS AND SPECIFICATIONS

Plans and specifications for constructing irrigation storage reservoirs shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purposes.

Design and check data will include all of the components listed in Virginia Conservation Practice Standard *Pond (Code 378)*. The following information is also required.

DESIGN DATA

1. Demand hydrograph(s).
2. Storage period.
3. Irrigation Water Management Plan (Virginia Conservation Practice Standard *Irrigation Water Management (Code 449)*).
4. Environmental Evaluation Form VA-EE-1.

CHECK DATA

As a minimum, record and maintain the following check data:

1. As-built cross-sections and inlet and outlet information.
2. Check data for Virginia Conservation Practice Standards used in plan.
3. Data on all structures installed.
4. Certification that practice meets Standards and Specifications. Note any exceptions.
5. A statement that the following have been satisfactorily completed:

   a) Spoil spreading
   b) Seeding or successful establishment of vegetation.

6. Completed list of Operation and Maintenance Requirements.

OPERATION AND MAINTENANCE

Operation and Maintenance Requirements shall be prepared for use by the landowner or operator. The requirements shall provide specific instructions for operating and maintaining facilities to ensure they function properly. The following provisions are required:

- Periodic cleaning and re-grading of collection facilities to maintain proper flow lines and functionality.
- Periodic checks and removal of debris from trash racks and from inlet and outlet structures to assure proper operation.
- Periodic removal of sediment to maintain design capacity and efficiency.
- Routine maintenance of all mechanical components in accordance with the manufacturer's recommendations.
- Periodic inspection and maintenance of embankments and earth spillways to control erosion and undesirable vegetation.
- Periodic water quality analysis as necessary to evaluate nutrients, pesticides, and pathogens.

REFERENCES

1. TR-60, Earth Dams and Reservoirs.
2. National Engineering Handbook, Part 650, Engineering Field Handbook.
3. National Engineering Handbook, Part 634-Hydraulics; Section 11 – Drop Spillways; or Section 14 – Chute Spillways.
4. NRCS, Virginia Field Office Technical Guide, Section IV.

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Approved Practice Narrative

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436 D1 Irrigation Storage Reservoir:
An irrigation storage reservoir shall be installed to conserve water by holding it in storage until it can be beneficially used to meet crop irrigation requirements.

NRCS, VA, August 2003